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PATENT TRADEMARK OFFICE

Docket No.: 2681/01231USO

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Technology Center 2600

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:

Alexander KLEINERMAN, Ariel ZALTSMAN

Serial No.: 09/773,358

Examiner: Not Assigned

Filed: January 31, 2001

Group Art Unit: Not Assigned

For: NORMALIZATION OF EQUALIZER SOFT OUTPUT FOR CHANNELS  
WITH VARYING NOISE POWER

April 18, 2001

INFORMATION DISCLOSURE STATEMENT

Hon. Commissioner of  
Patents and Trademarks  
Washington, DC 20231

Sir:

This Information Disclosure Statement is submitted in accordance with  
37 C.F.R. 1.97, 1.98, and it is requested that the information set forth in this

10/1

statement and in the listed documents be considered during the pendency of the above-identified application, and any other application relying on the filing date of the above-identified application or cross-referencing it as a related application.

1. This IDS should be considered, in accordance with 37 C.F.R. 1.97, as it is filed:

(Check one of the boxes A-D)

☒ A. Within three months of the filing date of the above-identified national application or within three months of the entry into the national stage of the above-identified international application.

☐ B. before the mailing date of a first office action on the merits, or a first office action after filing a request for continued examination.

☐ C. after (A) and (B) above, but before the mailing date of a final rejection, a notice of allowance, or any other action that closes prosecution, and Applicants have made the necessary statement in box "i" below or paid the necessary fee in box "ii" below.

(check one of the boxes "i" and "ii" below:)

☐ i. Counsel states that, upon information and belief, each item of information listed herein was either (a) cited in a communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this IDS; or (b) was not cited in a communication from a foreign patent office in a counterpart foreign application and, to the knowledge of undersigned after making

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reasonable inquiry, was not known to any individual designated in 1.56(c) more than three months prior to the filing of this IDS.

☐ ii.11. A check for the fee set forth in 1.17(p), presently believed to be \$180, is enclosed.

☐ D. after (A), (B) and (C) above, but before payment of the issue fee: Counsel states that, upon information and belief, each item of information listed herein was either (i) cited in a communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the IDS; or (ii) was not cited in a communication from a foreign patent office in a counterpart foreign application and, to the knowledge of the undersigned after making reasonable inquiry, was not known to any individual designated in 1.56(c) more than three months prior to the filing of this IDS.

☐ i. A check for the fee set forth in 1.17 (p), presently believed to be \$180, is enclosed.

2. In accordance with 37 C.F.R. 1.98, this IDS includes a list (e.g., form PTO-1449) of all patents, publications, or other information submitted for consideration by the office, either incorporated into this IDS or as an attachment hereto. A copy of each document listed is attached, except as explained below.

(check boxes A and/or B and fill in blanks, if appropriate.)

☐ A. Document(s) \_\_\_\_\_ is (are) deemed substantially cumulative to document(s) \_\_\_\_\_, and, in accordance with 1.98(c), only a copy of

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each of the latter documents is enclosed.

☐ B. Certain documents were previously cited by or submitted to the Office in the following prior applications, which are relied upon under 35 U.S.C. 120:

[SERIAL NO. & FILING DATE].

Applicant Identifies these documents by attaching hereto copies of the forms PTO-892 and PTO- 1449 from the files of the prior application(s) or a fresh PTO- 1449 listing these documents, and request that they be considered and made of record in accordance with 1.98(d). Per 37 CFR 1.98(d), copies of these documents need not be filed in this application.

☐ 3. Document(s) \_\_\_\_\_ are not in the English language. In accordance with 1.98(c), Applicant states:

☐ An English translation of each document (or of the pertinent portions thereof), or a copy of each corresponding English-language patent or application is enclosed.

☐ A concise explanation of the relevance of document(s) \_\_\_\_\_ is found in the attached search report (see MPEP § 609 A(3)x).

☐ A concise explanation of the relevance of document(s) \_\_\_\_\_ is set forth as follows: [Insert concise explanation of relevance]

☐ A concise explanation of the relevance of document(s) \_\_\_\_\_ can be found on page(s) \_\_\_\_\_ of the specification.

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☐ A concise explanation of document(s) \_\_\_\_\_ can be found on the attached sheet.

☐ 4. No explanation of relevance is necessary for documents in the English language (see MPEP § 609 A(3)).

☐ 5. Other information being provided for the examiner's consideration follows:

6. In accordance with 37 C.F.R. 1.97(g) and (h), the filing of this IDS should not be construed as a representation that a search has been made or that information cited is, or is considered to be, material to patentability as defined in §1.56 (b), or that any cited document listed or attached is (or constitutes) prior art. Unless otherwise indicated, the date of publication indicated for an item is taken from the face of the item and Applicant reserves the right to prove that the date of publication is in fact different.

CROSS REFERENCE UNDER 37 C.F.R. §1.78 TO RELATED APPLICATIONS

Pursuant to 37 C.F.R. § 1.79, Applicant notes that the above-identified patent application may be related to the following U.S. Patent Applications:

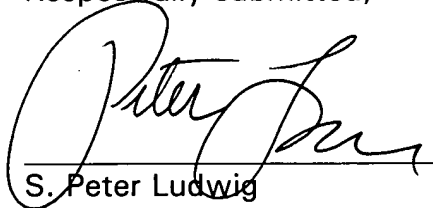
(1) U.S. Patent Application Serial No. 09/616,161, entitled METHOD OF CHANNEL ORDER SELECTION AND CHANNEL ESTIMATION IN A WIRELESS COMMUNICATION SYSTEM, filed July 14, 2000.

(2) U.S. Patent Application Serial No. 09/754,566, entitled SOFT DECISION OUTPUT GENERATOR, filed January 4, 2001.

(3) U.S. Patent Application Serial No. 09/754,570, entitled APPARATUS FOR AND METHOD OF CONVERTING SOFT SYMBOL INFORMATION TO SOFT BIT INFORMATION, filed January 4, 2001.

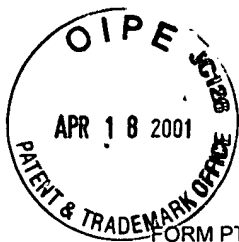
Early and favorable consideration is earnestly solicited.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "S. Peter Ludwig", is written over a horizontal line.

S. Peter Ludwig  
Registration No. 25,351  
Attorney for Applicant(s)

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FORM PTO-1449

U.S. DEPARTMENT OF COMMERCE PATENT &amp; TRADEMARK OFFICE

SHEET 1 OF 3  
(REV. 7-80)**LIST OF REFERENCES CITED BY APPLICANT**

(Use Several Sheets if Necessary)

DOCKET NO.: 2681/01231US0 SERIAL NO: 09/773,358  
APPLICANT: Alexander KIEINERMAN FILING DATE: January 31, 2001

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**U.S. PATENT DOCUMENTS**

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<u>*EXAMINER INITIALS</u>	<u>DOCUMENT NUMBER</u>	<u>DATE</u>	<u>NAME</u>	<u>CLASS</u>	<u>SUBCLASS</u>	<u>FILING DATE</u>
	1. 5,457,704	Oct. 1995	Hoeher et al.	371	43	

**FOREIGN PATENT DOCUMENTS**

<u>*EXAMINER INITIALS</u>	<u>DOCUMENT NUMBER</u>	<u>DATE</u>	<u>COUNTRY</u>	<u>CLASS</u>	<u>SUBCLASS</u>	<u>TRANSLATION YES NO</u>
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**OTHER REFERENCES****(INCLUDING AUTHOR, TITLE DATE, PERTINENT PAGES, ETC.)**\*EXAMINER  
INITIALS

2. Khayrallah, A.S., et al., "Improved Channel Estimation With Side Information", IEEE, pp. 1049-1051, 1997.

3. Boss, Dieter, et al., "Impact of Blind Versus Non-Blind Channel Estimation on The BER Performance of GSM Receivers", IEEE Signal Processing Workshop on Higher-Order Statistics, pp. 62-66, July 21-23, 1997.

4. Mehrotra, Asha, GSM System Engineering, Artech House Inc., 1997, pp. 169-245.

5. Haykin, Simon, Adaptive Filter Theory, Prentice Hall, 1996, pp. 483-535.

6. Gerstacker, Wolfgang H. et al., "Iterative Equalization With Adaptive Soft Feedback", IEEE, not dated.

7. Gerstacker, Wolfgang H. et al., "Improved Equalization for GSM Mobile Communications", IEEE, not dated.



FORM PTO-1449

U.S. DEPARTMENT OF COMMERCE PATENT & TRADEMARK OFFICE

SHEET 2 OF 3  
(REV. 7-80)

**LIST OF REFERENCES CITED BY APPLICANT**

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\*EXAMINER  
INITIALS

8. Hafeez, Abdulrauf, et al., "Decision Feedback Sequence Estimation for Unwhitened ISI Channels With Applications to Multiuser Detection" in IEEE Journal on Selected Areas in Communication, Vol. 16, No. 9, pp. 1785-1795, December 1998.

9. Forney Jr., G. David, "The Viterbi Algorithm", pp. 268-178, November 27, 1972.

10. Berrou, Claude, et al., "A Low Complexity Soft Output Viterbi Decoder Architecture", IEEE, pp. 737-740, December, 1993.

11. Thielecke, John A. "A Soft-Decision State-Space Equalizer for FIR Channels", IEEE Transactions on Communications, vol. 45, No. 10, pp. 1208-1217. October 10, 1997.

12. Hansson, Ulf et al., "Soft Information Transfer for Sequence Detection With Concatenated Receivers", IEEE Transactions on Communications, Vol. 44, No. 9, pp. 1086-1095, September 1996.

13. Seshadri, N. et al., "On Post-Decision Symbol-Reliability Generation", IEEE, pp. 741-745, February 1993.

14. Nagayasu, Takayuki, et al., "A Soft-Output Viterbi Equalizer Employing Expanded Memory Length in a Trellis", IEICE Trans. Commun. Vol. E80-B, No. 2, pp. 381-385, February 1997.

15. Park, Jong Il, et al., "Trellis-Based Soft-Output Adaptive Equalization Techniques for TDMA Cellular Systems", IEEE Transactions on Vehicular Technology, Vol. 49, No. 1, pp. 83-94, January 2000.

16. Fossorier, Marc P.C., et al., "On The Equivalence Between SOVA and Max-Log-MAP Decodings", IEEE Communications Letters, Vol. 2, No. 5, pp. 137-139, May 1998.





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SHEET 3 OF 3  
(REV. 7-80)**LIST OF REFERENCES CITED BY APPLICANT**

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• DOCKET NO.: 2681/OI231US0 SERIAL NO: 09/773,358 Technology Center 2600  
• APPLICANT: Alexander KIEINERMAN FILING DATE: January 31, 2001

\*EXAMINER  
INITIALS

17. Cong, Ling, et al., "On SOVA for Nonbinary Codes", IEEE Communications Letters, Vol. 3, No. 12, pp. 335-337, December 1999.

18. Hagenauer, Joachim, et al., "A Viterbi Algorithm with Soft-Decision Outputs and its Applications", IEEE, pp. 1680-1686, 1989.

19. Li, Yunixin, et al., "Optimum Soft-Output Detection for Channels with Intersymbol Interference", IEEE Transactions on Information Theory, Vol. 41, No. 3, pp. 704-713, May 1995.

20. Proakis, John G. Digital Communications, McGraw-Hill, 1989, pp. 602-643.

21. Han, Youngyearl, "On The Minimization of Overhead in Channel Impulse Response Measurement", IEEE Transactions on Vehicular Technology, Vol. 47, No. 2, pp. 631-636, May 1998.

22. Rahnema, Moe et al., "Optimum Soft Decision Decoding With Channel State Information in The Presence of Fading", IEEE Communications Magazine, pp. 110-111, July 1997.

EXAMINER: \_\_\_\_\_

DATE CONSIDERED: \_\_\_\_\_

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.